XLIII. *Obſervations made, by appointment of the Royal Society, at* King George's Iſland *in the* South Sea; *by Mr.* Charles Green, *formerly Aſſiſtant at the Royal Obſervatory at* Greenwich, *and Lieut.* James Cook, *of his Majeſty's Ship the* Endeavour.

Read November 21, 1771.

1769
April 13 WE came to an anchor in Royal Bay in King George's iſland.

15 Fixed upon the North point of the bay, which is the moſt Northern point of the iſland, for the place of obſervation; here we built a ſmall fort, to ſecure us againſt the natives, which we called fort Venus: it was not finiſhed and the inſtruments ſet up in proper order until the 10th of May, therefore the time for all obſervations made before this day, was taken by a watch with a ſecond hand, the going of which was aſcertained by altitudes of the ſun as often as were neceſſary.

The aſtronomical clock, made by Shelton and furniſhed with a gridiron pendulum, was ſet up in the middle of one end of a large tent, in a frame of wood made for the purpoſe at Greenwich, fixed firm and as low in the ground as the door of the clock-caſe would admit, and to prevent its being diſturbed by any accident, another framing of wood was made round this, at the diſtance of one foot from it. The pendulum was adjuſted

juſted exactly to the ſame length as it had been at Greenwich. Without the end of the tent facing the clock, and 12 feet from it, ſtood the obſervatory, in which were ſet up the journeyman clock and aſtronomical quadrant: this laſt, made by Mr. Bird, of one foot radius, ſtood upon the head of a large caſk fixed firm in the ground, and well filled with wet heavy ſand. A centinel was placed continually over the tent and obſervatory, with orders to ſuffer no one to enter either the one or the other, but thoſe whoſe buſineſs it was. The teleſcopes made uſe of in the obſervations were—Two reflecting ones of two feet focus each, made by the late Mr. James Short, one of which was furniſhed with an object glaſs micrometer. Thus furniſhed, the following obſervations were made.

Obſervations of equal Altitudes of the Sun for the Time, made with the Aſtronomical Quadrant.

1769	Time per clock of the Sun's Limb paſſing the Wires at equal Altitudes.							Obſervatory		Side of the clock		Remarks.
	h ′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	Mean noon per clock.	Baro.	Th.	Baro.	Th	
	9 39 5½	41 43	42 20	44 45	45 00	47 42½		30 18	86	30 19	82	
☿ May 10	2 04 11½	2 35	00 57	1 58 53	58 18	55 34½		30 16	83	30 15	82	C. G.
	11 51 38½	51 39	51 38½	51 39	51 39	51 38½	11 51 38,7					
	9 09 08	11 36	12 09	14 00	14 35	17 01		30 22	89	30 20	84	
♀ 12	Clondy	2 30 08	29 36	Cloudy	27 10	24 45		30 29	85	30 14	88	C. G.
		11 50 52	50 52½		50 52½	50 53	11 50 52,5					
	9 11 38	14 04	14 40	16 31	17 04½	19 33		30 35	89	30 15	86	
♄ 10	2 29 22	26 58	26 24	too late for theſe wires.				30 14	83	30 09	86	C. G.
	50 30	50 31	50 32				11 50 31					
	9 39 23	42 08	42 47	44 52	45 30	48 16		30 16	87	30 14	86	
☉ 14	Cloudy			1 55 24	54 46::	1 52 00:		30 20	86	30 19	88	C. G.
				11 50 08	50 08	50 08	11 50 08					
Without ſtop {	9 15 34	18 05	18 40	20 36	21 11	23 44						
	2 23 14	20 43	20 09	18 12	17 38	15 05						
	11 49 24	49 24	49 24½	49 24	49 24½	49 24½	11 49 9¼					
☿ 17	9 27 52	30 30	31 05	33 09	33 45½	36 25		30 19	88	30 15	84	
	2 10 27	7 50	7 14	5 9½	4 33½			30 11	87	30 00	84	C. G.
Withoutſtop	11 49 9½	49 10	49 9½	49 9¼	49 9½		11 49 9,55					
Stop {	8 21 02	23 15	23 45	25 27	25 56	28 11						None good but the firſt, all the reſt in a confuſed haze CG
	3 16 41:	Cloudy	14 00::	12 15:	11 45	Cloudy						
♃ 18	11 48 51½		48 52½	48 51	48 50½		11 48 51,4					
	8 36 31½	48 47	49 19	41 05	41 36	43 53		30 10	82	30 10	84	
	3 01 11	2 59 00::	58 26::	Cloudy	56 06½::	53 52::		30 09	82	30 08	86	
Reading off	11 48 51¼	48 53,5	48 52.5		48 51¼	48 52,5	11 48 51,2					
	9 44 51	47 44	48 23	50 39	51 19	54 17:						
	1 51 07	48 12	47 27	45 19	44 36	41 42						
☉ 21	11 47 59	47 58	47 55	47 59	47 57½	47 59½	11 47 58					
	10 3 39							30 25	81	30 22	84	
	1 32 17							30 19	82	30 17	87	C. G.
	11 47 58						11 47 58					
	9 12 24	14 59½	15 34	17 33	17 20	20 43		30 20	84	30 12	83	
	2 22 27	19 54	19 20	17 20		14 11		30 17	82½	30 11	82	C. G.
♂ 23	11 47 25½	47 26¾	47 27	47 26½		47 27	11 47 26½					
	9 30 46½	33 31	34 07	36 16	36 55	39 42½						
	2 03 57	1 15	2 00 39	58 28	57 52	55 05						
	11 47 21¾	47 23	47 23	47 22	47 23½	47 23¾	11 47 22,8					

Obſervations of equal Altitudes of the Sun for the Time, made with the Aſtronomical Quadrant.

	Time per clock of the Sun's Limb paſſing the Wires at equal Altitudes.							Obſervatory		Side of the clock.		Remarks.
1769.	h ′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	Mean noon per clock.	Baro.	Th.	Baro.	Th.	
May	7 43 17	45 26	45 55	47 33	48 02	50 10		30 19	82½	30 12	77½	
Reading off	3 51 01	48 52	48 26	46 45	46 16	44 09		30 13	80	30 07	83	J. C.
☿ 24	11 47 9	47 09	47 10½	47 09	47 09	47 9½	11 47 9⅓					
	8 05 29	7 39	8 10	9 52	10 21	12 33						
	3 28 52	26 41	26 11	24 29	23 59	21 49						
With ſtop	11 47 10½	47 10	47 10½	47 10½	47 10	47 11	11 47 10,4					
	10 04 21½	7 41½	8 26½	11 02½	11 50½	15 16		30 19	81½	30 15	81½	
♃ 25	1 29 32	26 12	25 27	22 49	22 03	Cloudy		30 07	80	30 10	82	J. C.
	11 46 56¾	46 56¾	46 56¾	46 55¾	46 56¾		11 46 56,55					
	8 15 59	18 20	18 42	20 35½	21 11	23 20		30 21	82	30 15	80½	
♄ 27	3 16 51	14 33	14 7	12 21	11 46	9 35		30 18	84	30 14	86	C. G.
	11 46 25	46 26½	46 24½	46 28¼	46 28½	46 27½	11 46 26,7					
	8 41 17	43 45	44 9	46 0	46 38	48 57		30 24	82	30 17	81½	
☉ 28	2 51 17	48 49	48 25	46 31	45 54	43 37		30 20	82	30 17	86	C. G.
	11 46 17	46 17	46 17	46 15½	46 16	46 17	11 46 16,6					
	9 05 39	8 18	8 44½	10 48½	11 28	13 57½		30 28	84	30 23	82	At 2h. 30′ P.M. wound up the clock and put it forward 10′ 57″. C. G.
☽ 29	2 26 25	23 46	23 20	21 17½	20 39	18 18		30 20	79	30 17	88	
	11 46 02	46 02	46 02¼	46 03	46 03½	46 2¼	11 46 2½					
Reading off	9 19 13½	21 55	22 23	24 23½	25 04½	27 45		30 29	78	30 22	80	
	2 34 28	31 48	31 18	29 16	28 37	26 06½		30 24	79	30 16	81½	J. C.
	11 56 50¾	56 51½	56 50½	56 49¾	56 50¾	56 50¾	11 56 50⅔					
	9 36 52	39 48	40 16½	42 27½	43 11	45 53						
♂ 30	2 16 38	13 47	13 19	11 07	10 24	too late						
	11 56 45	56 47½	56 47¾	56 47¼	56 47		11 56 46,9					
	9 55 57	59 06½	59 40½	10 02 02½	2 50	5 50						
	1 57 38	54 32	late	51 36	50 48	47 48						
	11 56 47½	56 49¼		56 49¼	56 49	56 49	11 56 48,8					
	8 30 09	32 30	33 7	34 42	35 17½	37 31		30 28	80½	30 21	78	
	3 23 01	20 40	20 04	18 27	17 53	15 39		30 21	79	30 16	82	J. C.
☿ 31	11 56 35	56 35	56 35½	56 34½	56 35¼	56 35	11 56 35					
	9 36 08	38 59	39 29	41 39	42 21½	45 06						
	2 17 3½	14 13	13 43	11 32	10 51	08 06						
	11 56 35¾	56 36	56 36	56 35½	56 36¼	56 36	11 56 36					
June	8 24 00	25 19	26 46	28 31	29 06	31 18		30 24	89½	30 17	76½	
♃ 1	3 28 51	27 33	26 06	24 21	23 46	21 34		30 32	91	30 20	84	J. C.
	11 56 25½	56 26	56 26	56 26	56 26	56 26	11 56 26					

Obſervations of equal Altitudes of the Sun for the Time, made with the Aſtronomical Quadrant.

	Time per Clock of the Sun's Limb paſſing the Wires at equal Altitudes.							Obſervatory		Side of the clock.		Remarks.
							Mean noon per clock	Baro.	Th.	Baro.	Th.	
1769	h ′ ″	′ ″	′ ″	′ ″	′ ″	′ ″						
June	7 39 46	41 48	42 12	43 52	44 24	46 29		30 22	80½	30 12	73½	
	4 12 53½	10 43	10 18	8 37	8 6	6 1		30 18	81	30 15	82½	J. C.
♀ 2	11 56 14¾	56 15½	56 15	56 14½	56 15	56 15	11 56 15					
	7 54 39	56 52	57 17	58 59	59 32	8 01 38						
	3 57 54½	55 42	55 17	53 34	53 02	50 55						
	11 56 16¾	56 17	56 17	56 16½	56 17	56 16½	11 56 16,8					
	7 36 43	39 01	39 25	41 03	41 37	43 42		30 20	86½	30 13	75	Note, the clock was expoſed to the ſun from 9 or 10 o'clock in the morning till 4 in the afternoon. J. C.
	4 15 17	13 00	12 35	10 57	10 26	8 22		30 20	86½	30 15	98	
♄ 3	11 56 00	56 00½	56 00	56 00	56 01½	56 02	11 56 00⅔					
	7 46 20	48 32½	48 57	50 38½	51 10	53 15						
	4 5 40	3 28	3 05	1 21	00 50	58 45						
	11 56 00	56 00¼	56 01	55 59¾	56 00	56 0	11 56 00⅙					
	8 11 43	14 02	14 26	16 12	16 45	18 56		30 22	80	30 13	77½	The obſervations of both yeſterday and today are as good as can be made. J. C.
With ſtop	3 39 58	37 40	37 16	35 29	34 56	32 45		30 20	88½	30 13	86½	
☉ 4	11 55 50½	55 51	55 51	55 50½	55 50½	55 50½	11 55 50⅔					
	8 29 50	32 13	32 38	34 28	35 02	37 16½						
With ſtop	3 21 50	19 28	19 04	17 13	16 39	late						
	11 55 50	55 50½	55 51	55 50½	55 50½		11 55 50½					
	9 11 41	14 15	14 45	16 47½	17 16	19 47	″ } to reduce journeyman	30 19	83	30 14	83	
☽ 5	2 39 28	36 53	36 22½	34 20	33 52	31 21	+1 } clock to the	30 17	80	30 15	84	C. G.
	11 55 34½	55 34	55 34¼	55 33¾	55 34	55 34	+7 } other clock.					
							11 55 38,1					
	8 13 19		16 1	17 48	18 22	20 34:		30 18	79	30 16	80	
♂ 6	3 37 36		44 57	33 10	32 37	30 26		30 14	81	30 10	88	C. G.
	11 55 27½		55 29	55 29	55 29½	55 30	11 55 29					
	8 58 22	00 45	9 01 12	3 09	3 44	6 10::		30 20	85	30 18	83	
☿ 7	2 52 13	49 50	49 24	47 25	46 51	44 26::		30 17	82	30 16	86	C. G.
	11 55 17½	55 17½	55 18	55 17	55 17½	55 18::	11 55 17½					
	7 47 45-	49 57	Cloudy	52 05	52 36	54 40		30 20	84	30 17	83	
♃ 8	4 02 34	00 20	3 59 57	58 14	57 41	Cloudy		30 17	82	36 14	83	C. G,
	11 55 09½	55 8½		55 09½	55 08½		11 55 09					
	9 50 00	53 02	53 35	56 04	56 47	59 48		30 19	81	30 17	84	
♀ 9	1 59 49	56 44	56 11	53 46	53 02	50 00		30 11	79	30 14	83½	C. G.
	11 54 54½	54 53	54 53	54 55	54 54½	54 54	11 54 54					
	9 57 43							30 24	74	30 20	74	C. G.
☉ 11	1 51 38	} Cloudy in the afternoon.										
	11 54 40½						11 54 40½					

Obſervations of equal Altitudes of the Sun for the Time, made with the Aſtronomical Quadrant.

	Time per Clock of the Sun's Limb paſſing the Wires at equal Altitudes.							Obſervatory		Side of the clock		Remarks.
1769 June	h ′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	Mean noon per clock	Baro.	Th.	Baro.	Th	
☽ 12	7 52 56 3 56 14 11 54 35	55 33 53 35 54 34	55 36		57 52:		11 54 34,5	30 20 30 17	78½ 80½	30 15 30 12	77 82	C. G.
♂ 13	9 14 52 2 34 10 11 54 31	17 34 31 28 54 31	18 02 30 59 54 30½	20 06 28 54 54 30	20 45 28 15 54 30		11 54 30½	30 16	82	30 16	83	C. G.
☿ 14	8 34 03 3 14 37 11 54 20	36 31 12 10 54 20½	36 57 11 45 54 21	38 49 9 54 54 21½	39 23 9 21 54 22	41 40 late	11 54 21	30 16 30 16	81 82	30 10 30 12	80 87	C. G.
♄ 17	8 15 31 Cloudy 8 29 32 Cloudy	17 52 3 30 04 53 58 31 59 3 15 55: 53 57	18 15 29 41 53 58 Cloudy 15 33::	Cloudy 27 52 34 16 13 40: 53 58	20 36 Cloudy 34 48 13 06 53 57	22 47 25 07 53 57 37 05 late	11 53 57,7 11 53 57,3	30 08 30 10	71 83	30 04 30 05	70 80	C. G.
☉ 18	9 13 48 2 33 48 11 53 48	16 32 31 05 53 48½	16 59 30 39 53 49	19 04 28 32 53 48	19 42 27 55 53 48½	22 17 25 20 53 48½	11 53 48,5	30 26 30 14	78½ 76	30 14 30 10	79 77	C. G.
☽ 19	8 52 55 2 54 30 11 53 42½	55 28	55 55 51 30 53 42½	57 49 49 34 53 41½	58 25 48 57 53 41	9 00 50 46 33 53 41½	11 53 41,8	30 17 30 12	74 76	30 13 30 10	72 79	C. G.
♂ 20	8 13 26 3 33 45 11 53 35½	15 47 31 24 53 35½	16 11 31 00 53 35½	18 00 29 11 53 35½	18 33 28 38 53 35½	20 47 26 25 53 36	11 53 35,6	30 12 30 18	77 84	30 10 30 08	77 83	C. G.
☿ 21	7 49 01 3 57 50 11 53 25½	51 15 55 35 53 25	51 38 55 12 53 25	53 22 53 27 53 24½	53 54 52 55 53 24½	56 01 50 49 53 25	11 53 25	30 07 30 10	70 78	30 07 30 12	70 80	C. G.
♃ 22	8 25 23 3 21 14 11 53 18½	Cloudy in the afternoon.					11 53 18½	30 17	82	30 16	80	C. G.
♄ 24	7 57 50 3 48 10 11 53 00	8 00 07 45 54 53 00½	00 30 45 31 53 00½	2 15 43 46 53 00½	2 49 43 12 53 00½	4 58 41 01 53 01½	11 53 00½	30 16 30 11	80 78	30 11 30 08	74 82	C. G.

Obſervations of equal Altitudes of the Sun for the Time, made with the Aſtronomical Quadrant.

	Time per clock of the Sun's Limb paſſing the Wires at equal Altitudes.							Obſervatory		Side of the clock.		Remarks.
1769 June	h ′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	Mean noon per clock.	Baro.	Th.	Baro.	Th.	
☉ 25	10 06 49 1 39 00 11 52 54½	10 12 35 31 52 51½	10 50 34 55 52 52½	13 35 32 10 52 52½	14 27 31 20 52 53½	17 50 27 53 52 51¼	11 52 52⅔	30 18	84	30 15	81	C. G.
♂ 27	9 27 17 2 17 53 52 35	30 10 15 01 52 35½	30 39 14 33 52 36	32 49 12 21 52 35	33 31 11 39 52 35	36 15 8 56 52 35½	11 52 35⅓	30 14 30 07	78 78	30 13 30 10	78 80	C. G.
July ☉ 2	8 02 29 3 41 10 11 51 49½	} Cloudy in the afternoon.					11 51 49½	30 18 30 15	76 83	30 12 30 11	75 84	C. G.
☽ 3	9 07 13 2 36 10 11 51 41½	9 51 33 34 51 42½	10 19 33 06 51 42½	12 21 31 02 51 41½	13 00 30 25 51 42½	15 31 27 52 51 41½	11 51 42	30 18 30 14	82 81	30 11 30 11	82 86	C. G.
♂ 4	7 33 21 4 09 43 11 51 32	35 33 7 31 51 32	35 55	37 36 5 27 51 31½	38 07 4 57 51 32	40 13 2 50 51 31½	11 51 31,8	30 11 30 10	71 84	30 11 30 13	70 84	C. G.
♃ 6	7 29 44 4 12 35 11 51 09½	31 57 10 24 51 10½	32 19 10 03 51 11	34 01 8 19 51 10			11 51 10¼	30 22 30 18	72 78	30 13 30 17	71 80	C. G.
♄ 8	Took down the Clocks and Obſervatory; the Pendulum vibrated 1° 55′ on each Side the Center, the Bob remained as at Greenwich.											

Account of the going of the Aſtronomical clock at King George's Iſland, deduced from the foregoing Obſervations.

Day of the Month	Corrected noon per clock			Mean Time			Clock ſlow for M. T.		Clock loſes		Inter-val of	Daily loſs of clock
1769	H.	M.	S.	H.	M.	S.	M.	S.	M.	S.	Days	S.
May 10	11	51	44,8	11	56	2,8	4	18,0	0	43,4	2	21,7
12	11	50	58,3	11	55	59,7	5	1,4	0	20,9	1	20,9
13	11	50	36,7	11	55	59,0	5	22,3	0	22,7	1	22,7
14	11	50	13,7	11	55	58,7	5	45,0	1	1,4	3	20,5
17	11	49	15,0	11	56	1,4	6	46,4	0	20,6	1	20,6
18	11	48	56,4	11	56	3,4	7	7,0	1	2,5	3	20,8
21	11	48	3,0	11	56	12,5	8	9,5	0	42,5	2	21,2
23	11	47	29,4	11	56	21,4	8	52,0	0	20,5	1	20,5
24	11	47	14,1	11	56	26,6	9	12,5	0	18,7	1	18,7
25	11	47	1,1	11	56	32,3	9	31,2	0	45,9	2	22,9
27	11	46	28,1	11	56	45,2	10	17,1	0	14,6	1	14,6
28	11	46	20,7	11	56	52,4	10	31,7	0	22,2	1	22,2
29	11	46	6,3	11	57	0,2	10	53,9				
The clock was put forward 10′ 57″.									0	19,0	1	19,0
30	11	56	52,5	11	57	8,4	0	15,9	0	22,2	1	22,2
31	11	56	39,0	11	57	17,1	0	38,1	0	19,0	1	19,0
June 1	11	56	29,1	11	57	26,2	0	57,1	0	19,6	1	19,6
2	11	56	18,9	11	57	35,6	1	16,7	0	25,5	1	25,5
3	11	56	3,2	11	57	45,4	1	42,2	0	20,1	1	20,1
4	11	55	53,3	11	57	55,6	2	2,3	0	23,0	1	23,0
5	11	55	40,8	11	58	6,1	2	25,3	0	20,8	1	20,8
6	11	55	30,9	11	58	17,0	2	46,1	0	22,3	1	22,3
7	11	55	19,8	11	58	28,2	3	8,4	0	20,2	1	20,2
8	11	55	11,0	11	58	39,6	3	28,6	0	26,5	1	26,5
9	11	54	56,1	11	58	51,2	3	55,1	0	37,5	2	18,7
11	11	54	42,3	11	59	14,9	4	32,6	0	18,7	1	18,7
12	11	54	35,8	11	59	27,1	4	51,3	0	16,4	1	16,4
13	11	54	31,8	11	59	39,5	5	7,7	0	22,2	1	22,2
14	11	54	22,1	11	59	52,0	5	29,9	1	2,0	3	20,7
17	11	53	58,1	0	0	30,0	6	31,9	0	22,0	1	22,0
18	11	53	48,9	0	0	42,8	6	53,9	0	19,8	1	19,8
19	11	53	42,0	0	0	55,7	7	13,7	0	19,3	1	19,3
20	11	53	35,6	0	1	8,6	7	33,0	0	23,6	1	23,6
21	11	53	24,8	0	1	21,4	7	56,6	0	19,4	1	19,4
22	11	53	18,2	0	1	34,2	8	16,0	0	43,6	2	21,8
24	11	53	0,0	0	1	59,6	8	59,6	0	20,9	1	20,9
25	11	52	51,7	0	2	12,2	9	20,5	0	42,5	2	21,2
27	11	52	34,1	0	2	37,1	10	3,0	1	45,6	5	21,1
July 2	11	51	47,5	0	3	36,1	11	48,6	0	18,9	1	18,9
3	11	51	39,7	0	3	47,2	12	7,5	0	20,9	1	20,9
4	11	51	29,6	0	3	58,0	12	28,4	0	42,5	2	21,2
6	11	51	7,7	0	4	18,6	13	10,9				

Hence the daily rate of the clock's loſing on mean time, by a mean of theſe 40 reſults, is 20,8 ſeconds. By the firſt and laſt days obſervations compared together, the clock loſt 19′ 49,″9 on mean time in 57 days, which is at the rate of 20,″88 or 20,″9 per day. The ſwing of the pendulum

pendulum on each ſide of the perpendicular during this time, varied between 1° 50′ and 1° 55′.

Remark. The ſame clock, when fixed up at the Royal Obſervatory at Greenwich, before the voyage, with the pendulum of the ſame length, got at the rate of 1′ 45,8″ per day, on mean time, between April 19 and July 18, 1768. Therefore the force of gravity at Greenwich is to that at King George's Iſland, as 1000000 to 997075. N. M.

Obſervations of meridian zenith diſtances of the ſun and fixed ſtars for finding the latitude of the Obſervatory.

Day of the month	Name of the object	Meridian zen. diſt.			Latitude South			Mean
1769		D.	M.	S.	D.	M.	S.	
May 6	Sun's lower limb	34	33	7	17	29	17	° ′ ″ 17 28 20
May 27	Sun's upper limb	38	39	10	17	27	52	
May 28	Ditto	38	50	0	17	29	9	
29	Ditto	38	59	0	17	29	2	
30	Ditto	39	8	12	17	29	26	
31	Ditto	39	16	21	17	29	11	
June 7	Ditto	40	3	32	17	29	29	
8	Ditto	40	9	0	17	28	42	
9	Ditto	40	13	0	17	27	51	
10	Ditto	40	17	0	17	27	54	
11	Ditto	40	21	0	17	27	21	
12	Ditto	40	26	0	17	28	42	
13	Ditto	40	29	0	17	28	28	
15	Ditto	40	34	0	17	28	14	
17	Ditto	40	36	30	17	27	10	
18	Ditto	40	38	30	17	27	59	
19	Ditto	40	39	0	17	27	48	
20	Ditto	40	39	30	17	27	54	
22	Ditto	40	39	30	17	28	27	
25	Ditto	40	44	56	17	27	48	
27	Ditto	40	30	0	17	27	33	
June 21	Arcturus	37	53	0	17	30	29	17 29 9
22		37	50	0	17	27	29	
24		37	51	40	17	29	9	
July 4		37	52	0	17	29	29	
June 24	α Lyræ	56	3	20	17	29	53	17 29 43
27		56	3	0	17	29	33	
June 24	γ Aquilæ	27	32	20	17	28	45	17 28 59
28		27	32	48	17	29	13	
June 28	α Aquilæ	25	44	30	17	28	20	17 28 20
June 28	β Aquilæ	23	19	0	17	28	30	17 28 30
June 24	α Cygni	61	56	0	17	29	36	17 28 56
28		61	54	40	17	28	16	

The ſun and foregoing ſtars paſſed the meridian to the North; the following ſtars paſſed the meridian to the South above the pole.

Day of the month	Name of the object	Meridian zen. diſt.	Latitude South	Mean
1769		D. M. S.	D. M. S.	° ′ ″
June 23	Fomalhaut	13 20 0	17 29 37	17 29 37
June 23	α Crucis	44 20 0	17 28 44	17 28 44
June 23	γ Crucis	38 19 0	17 29 50	17 29 50
June 21	β Crucis	40 54 30	17 30 36	17 30 28
23		40 54 45	17 30 21	
June 22	α Centauri	42 22 0	17 29 59	17 30 9
24		42 21 40	17 30 19	
June 21	β Centauri	41 44 10	17 30 9	17 29 56
24		41 44 26	17 29 53	
27		41 44 32	17 29 47	
June 23	β Gruis	30 33 40	17 30 18	17 29 38
24		30 35 0	17 28 18	
June 23	β Hydri	61 1 15	17 29 54	17 29 54
June 24	α Pavonis	39 57 36	17 28 5	17 28 31
28		39 56 44	17 28 57	

The mean of the ſeven mean reſults from the ſun and ſix ſtars, to the North, gives the latitude 17° 28′ 51″ S. The mean of the nine reſults from the nine ſtars to the South, gives the latitude 17° 29′ 38″ S. The mean of theſe two means is 17° 29′ 15″ S. which may be taken for the latitude of the obſervatory.

N. B. Before any obſervations were made with the quadrant, the line of collimation was adjuſted, by means of a diſtant object, by inverting the quadrant.

REMARK. It muſt be confeſſed, that the reſults of theſe obſervations (moſt of which were made by Mr. Green) differ more from one another than they ought to do, or than thoſe do made by other obſervers, with quadrants of the ſame ſize, and made by the ſame artiſt, the cauſe of which, if not owing to want of care and addreſs in the obſerver, I don't know how to aſſign. N. M.

Lunar Obſervations for the Longitude.

Month	Day	Time per clock	Alt. or Z.D. of ☉ or *	Alt. or Z.D. of the ☽	Diſt. of ☽ a. ☉ or ☽ and *	Whether Alt. or Z. D. and what Limb	Error of Quadrant	Apparent Time cor.	Longitude given	Mean of each days ſets
1769		h ′ ″	° ′ ″	° ′ ″	° ′ ″		′ ″	h ′ ″	° ′ ″	° ′ ″
April		22 17 30	49 34 00	54 30 50	57 31 30	☉'s Alt. L. L.	☽ an. ☉ — 2 30	22 25 40	149 23 15	
☽	30	22 18 46	51 10 00	52 00 10	26 40	☽'s Alt. U.L.	☽ — 5 30	37 24	20 30	
		22 27 54	52 16 40	49 52 50	23 55			46 24	25 45	149 23 10
					*'s N. L.					
May		9 52 57	27 29 40	79 54 00	52 55 00	*'s Altitude	* — 2 00	10 03 19	148 59 00	
* Regulus	16	10 02 34	24 58 20	77 51 40	52 58 10	☽'s Alt. L.L.		12 56	149 14 15	
♂		10 12 57	22 34 20	75 21 00	53 01 05			23 19	39 15	149 17 30
					* F. L.					
* Antares		10 44 26	25 17 17	68 14 00	46 44 27	*'s Zen.Diſt.	*'s Z.D. + 2 00	10 54 48	149 34 15	
		10 59 00	22 07 40	64 55 00	40 00	☽'s Alt. L.L.		11 09 22	19 15	
♂	16	11 09 48	19 51 00	62 27 00	37 00			11 20 10	07 30	149 20 30
* Regulus		8 05 46	47 28 30	26 53 10	64 29 30	*'s Altitude		8 16 21	149 57 30	
		21 54	44 35 00	23 25 50	34 55	☽'s Z.D.U.L.	*'s Alt. — 2 00	32 29	43 30	
☿	17	30 03	43 06 40	21 11 50	38 10			40 38	150 30 15	150 03 45
☽ and ☉		21 28 52	38 22 00	26 55 10	100 37 05	☉'s Alt. L.L	☉'s Alt. — 6 00	21 42 22	148 01 45	
		42 29	40 31 20	24 05 50	30 45	☽'s Alt. U.L.	☽'s Alt. — 5 00	21 55 59	21 45	
♀	26	55 34	42 25 40	21 03 40	24 40			22 09 04	27 30	148 17 30
☽ and ☉		22 24 35	45 50 00	32 16 50	75 25 30			22 38 30	149 52 00	
		29 51	46 24 00	31 06 00	23 50	☉'s Alt. L. L.	☽ — 4 00	43 46	30 00	
☉	28	39 19	47 21 00	28 57 20	20 10	☽'s Alt. U. L.	☽ and ☉ + 1 00	53 14	41 45	
		44 48	47 52 20	27 40 40	18 20			58 43	30 30	
		51 33	48 22 20	26 08 20	15 40			23 05 28	21 30	149 35 09
* α Aquilæ		18 49 32	43 12 20	52 53 40	67 03 30	*'s Altitude	☽ and * + 1 30	18 52 44	149 54 15	
☽	29	56 38	41 56 20	54 06 40	05 26	☽'s Alt. L.L.	☽'s Alt. — 4 00	59 50	50 15	149 52 15
☽ and ☉		22 10 57	42 36 20	45 37 40	62 31 50			22 14 09	150 05 15	
		18 03	43 36 20	44 05 40	30 20	☉'s Alt. L. L.	☽'s Alt. — 4 00	21 15	149 36 30	
		25 28	44 29 00	42 32 20	27 40	☽'s Alt. U.L.	☽ and ☉ + 1 30	28 40	28 15	
☽	29	30 46	45 10 20	41 28 50	25 20			33 58	42 30	
		35 53	45 48 00	40 28 20	23 50			39 05	34 30	149 41 24
June		4 18 53	13 36 00	42 52 20	111 32 50	☉'s Alt. L. L.	☽'s Alt. — 3 00	4 24 17	151 03 00	
☽ and ☉		28 12	11 37 00	40 36 40	34 10	☽'s Z.D.U.L.	☽ and ☉ + 1 30	33 56	150 19 30	
☽	12	37 56	9 39 50	38 24 00	36 20			43 20	18 30	150 33 40
		3 17 21	25 56 40	66 39 40	122 20 45			3 22 53	148 43 30	
		22 54	24 35 50	65 03 20	24 30	☉'s Alt. L. L.		28 25	149 35 20	
		29 43	23 23 40	63 33 20	26 50	☽'s Z.D.U.L.		35 15	22 20	
♂	13	44 36	20 25 20	60 01 40	32 10			50 08	08 15	
		50 48	19 07 00	58 34 40	35 00			56 20	29 00	149 15 43

Lunar Obſervations for the Longitude.

Month	Day	Time per clock	Alt. or Z.D. of ☉ or ✱	Alt. or Z. D. of the ☽	Diſt. of ☽ a. ☉ or ☽ and ✱	Whether Alt. or Z. D. and what Limb	Error of Quadrant	Apparent Time cor.	Longitude given	Mean of each Days Sets
1769		h ′ ″	° ′ ″	° ′ ″	° ′ ″		″	h ′ ″	° ′ ″	° ′ ″
June		10 09 34	47 59 40	14 26 40	55 33 20	✱'s Altitude	✱'s Alt. + 5 00	10 15 40	149 00 51	
✱ Spica		20 14	45 26 10	12 14 00	36 50	☽'sZ.D.U.L.	☉ and ✱ + 1 30	26 20	17 30	
♄	17	28 34	43 30 00	10 36 20	40 00			34 40	39 00	149 18 55
					✱ N. L.					
✱ Fomalh.		13 27 30	46 46 00	68 20 00	63 08 20	✱'s Zen.Diſt.		13 33 46	150 01 15	
		38 49	44 20 26	65 53 00	5 10	☽'s Alt. L.L.	☽ and ✱ + 1 30	45 05	26 00	
☉	18	46 56	42 36 00	64 15 20	3 30			53 12	10 15	150 12 30
					✱ F. L.					
✱ α Aquilæ		15 10 21	51 09 20	27 08 40	51 01 00	✱'s Altitude	✱'s Alt. − 3 00	15 17 26	150 15 30	
		20 04	49 51 40	25 24 40	3 00	☽'sZ.D.L.L.	☽ and ✱ + 1 30	27 09	149 52 00	
♄	24	27 32	48 22 40	24 02 00	4 47			34 57	46 00	149 57 50
		21 46 12	38 41 20	30 49 20	79 45 31			21 53 37	149 29 00	
		54 20	39 53 40	29 08 00	42 20	☉'s Alt. L. L.	☽'s Alt. − 3 00	22 01 45	34 15	
☽	26	59 42	40 39 00	28 00 10	40 20	☽'s Alt. U.L.	☽ and ☉ + 1 30	07 07	23 15	
		22 4 03	41 12 20	27 05 00	38 10			11 28	33 30	
		7 48	41 40 00	26 17 20	37 00			15 13	10 15	149 26 03
		20 36 16	26 56 00	50 01 20	66 54 10			20 43 47	149 09 45	
		44 07	28 23 20	48 56 20	50 30	☉'s Alt.L.L.	☽'s Alt. − 3 00	51 38	43 00	
♂	27	50 31	29 31 40	48 00 40	49 20	☽'s Alt.U.L.	☽ and ☉ + 1 30	58 02	12 15	
		55 31	30 25 20	47 14 40	47 26			21 03 02	27 45	
		59 52	31 09 40	46 34 40	45 40			07 23	30 00	149 24 33
		21 13 57	33 43 20	40 28 00	39 06 10	☉'s Alt. L.L		21 21 44	149 52 30	
♀	30	23 52	35 24 00	40 45 40	02 07	☽'sZ.D.cent.		31 39	150 14 45	
		30 12	36 25 20	41 00 20	00 10			37 59	10 15	150 05 50

Note. Every line of the Lunar Obſervations is the mean of three, which we call a ſet. We take three or five ſuch ſets at a time, and calculate the mean of each ſeparately. The ground where all the Altitudes were taken, is 13 feet 6 inches above the horizontal level: the zenith diſtances are all taken with the Aſtronomical Quadrant. Theſe diſtances of the Moon from the Sun and fixt ſtars, were obſerved with a braſs Hadley's ſextant, fitted with edge-bars, made by Mr. Ramſden.

Mean of theſe Obſervations gives George's Iſland to be in Long. 149° 36′ 38″ W. of Greenwich Obſervatory, at ♀'s fort.

Obſervations of the Eclipſes of Jupiter's Satellites, with reflecting Teleſcopes of 2 Feet Focus, and the Longitude of the Obſervatory thence deduced.

1769	Time per clock	Apparent time cor.		Phænomena and Sat.	Time at Green. per Naut. Alm.	Long. W. of Green. in time
	h ′ ″	h ′ ″				
May 10	10 02 30	16 11 1		Emerſ. of the 1ſt Sat.		
	16 03 30	Capt. Cook	16 12 1			
12	10 27 55	10 37 6		Ditto		
	10 28 05	Capt. Cook	10 37 16			
27	11 44 04	11 57 39	11 57 40	Second Satellite		
	11 44 05	Capt. Cook	very clear			
	11 47 15	12 00 51	12 1 44	Third ditto		
	11 48 08	Capt. Cook				
June 4	10 41 19	10 45 31		Firſt ditto	20 44 39	9 59 4
	10 41 28	Capt. Cook	10 45 40			
13	7 02 45	7 08 19		Ditto	17 6 31	9 58 14
	7 02 45	Capt. Cook	7 8 16			
18	14 27 21	14 33 36		Ditto	24 31 41	9 57 41
	14 28 09	Capt. Cook	14 34 24			
20	8 55 15	9 1 43		Ditto	19 0 2	9 58 19
21	8 46 45	8 53 22				
	8 47 44	Capt. Cook	8 54 21	Second Satellite		
27	10 48 45	10 56 15		Firſt ditto	20 53 43	9 57 28
July 4	12 42 40	12 51 16		Ditto	22 47 33	9 56 17
6	7 09 20	7 18 16		Ditto	17 16 05	9 57 47
	7 09 25	Capt. Cook	7 18 21			

Mean of the ſeven obſervations of the firſt Satellite, rejecting thoſe of the 10th and 12th of May, as too near Jupiter's oppoſition to the Sun, gives the longitude of Venus's Fort 9^h 57′ 50″ = 149° 27′ 30″. Add 20″ for the correction of the times in the nautical almanack, as found by the obſervations of March 29 and April 12, at Greenwich, the true longitude will be 9^h 58′ 10″ = 149° 32′ 30″.

Eclipſe of the Moon.

June 18	8 18 5	8 24 18	Beginning of the eclipſe
	11 52 30	11 58 44	End of the eclipſe
	11 52 10	11 58 24	Ditto by Capt. Cook
	11 55 37	12 1 48	The ☽ clear of the penumbra
	11 55 10	12 1 21	Ditto by Capt. Cook.

Tranſit of Venus by Mr. Green, with a reflecting teleſcope of 2 feet focus, magnifying power 140 times.

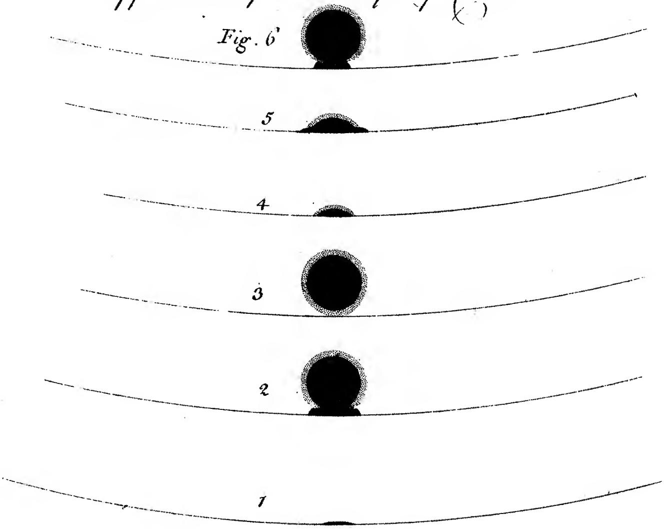
Time per clock h ′ ″		App. time June 2
9 21 45	Light thus on the ☉'s limb, Tab. XIV. fig. 1.	21 25 40
22 00	Ceſtain, fig. 2.	21 25 55
39 20	Firſt internal contact of ♀'s limb and the ☉ ſee fig. 4.	21 43 15
40 00	Penumbra and ☉'s limb in contact, ſee fig. 5.	21 43 55
		June 3
3 10 05	Firſt contact of penumbra, undulating, but the thread of light viſible and inviſible alternately	3 14 3
10 53	Second internal contact of the bodies	3 14 51
27 30	Second external contact	3 31 28
28 16	Total egreſs of penumbra, ☉'s limb perfect	3 32 14

Tranſit of Venus by Capt. Cook, with a reflecting teleſcope of 2 feet focus, and the magnifying power 140.

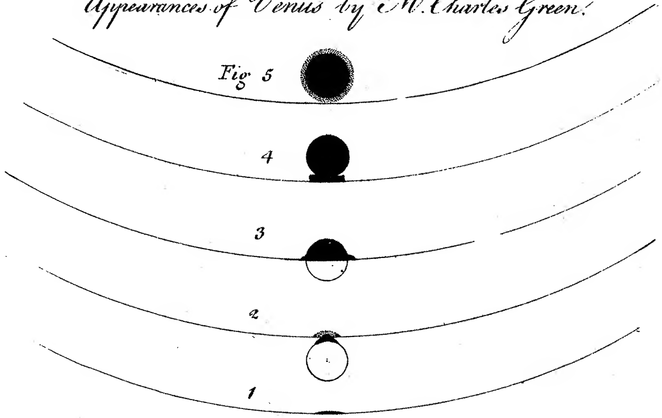
Time per clock h ′ ″		App. time June 2
9 21 50	The firſt viſible appearance of ♀ on the ☉'s limb, ſee fig. 1.	21 25 45
39 20	Firſt internal contact, or the limb of ♀ ſeemed to coincide with the ☉'s, fig. 2.	21 43 15
40 20	A ſmall thread of light ſeen below the penumbra, fig. 3.	21 44 15
		June 3
3 10 15	Second internal contact of the penumbra, or the thread of light wholly broke	3 14 13
10 47	Second internal contact of the bodies, and appeared as in the firſt	3 14 45
27 24	Second external contact of the bodies	3 31 22
28 04	Total egreſs of penumbra, dubious	3 32 2

The firſt appearance of Venus on the Sun, was certainly only the penumbra, and the contact of the limbs did not happen till ſeveral ſeconds after, and then it appeared as in fig. the 4th; this appearance was obſerved both by Mr. Green and me; but the time it happened was not noted by either of us; it ap-

Appearances of Venus by Capt. Cook.



Appearances of Venus by Mr. Charles Green.



Basire sc.

peared to be very difficult to judge preciſely of the times that the internal contacts of the body of Venus happened, by reaſon of the darkneſs of the penumbra at the Sun's limb, it being there nearly, if not quite, as dark as the planet. At this time a faint light, much weaker than the reſt of the penumbra, appeared to converge towards the point of contact, but did not quite reach it, ſee fig. 2. This was ſeen by myſelf and the two other obſervers, and was of great aſſiſtance to us in judging of the time of the internal contacts of the dark body of Venus, with the Sun's limb. Fig. the 5th, is a repreſentation of the appearance of Venus at the middle of the egreſs and ingreſs, for the very ſame phænomenon was obſerved at both: at the total ingreſs, the thread of light made its appearance with an uncertainty of ſeveral ſeconds; I judged that the penumbra was in contact with the Sun's limb 10″ ſooner than the time ſet down above; in like manner at the egreſs the thread of light was not broke off or diminiſhed at once, but gradually, with the ſame uncertainty: the time noted was when the thread of light was wholly broke by the penumbra. At the total egreſs I found it difficult to diſtinguiſh Venus's limb from the penumbra; which of courſe made the ſecond external contact a little doubtful, and the preciſe time that the penumbra left the Sun could not be obſerved to any great degree of certainty, at leaſt by me. Some of the other gentlemen, who were ſent to obſerve at different places, ſaw at the ingreſs and egreſs the ſame phænomenon as we did; though much leſs diſtinct, which no doubt was owing to their teleſcopes being of a leſs magnifying power; for the penumbra was viſible through my teleſcope during the whole Tranſit; and Dr. Solander, whoſe teleſcope magnified more than ours, ſaw it, I have reaſon to think, diſtincter than either Mr. Green or myſelf; though we both of us ſaw enough to convince our ſenſes, that ſuch a phænomenon did indiſputably exiſt, and we had a good opportunity to obſerve it, for every wiſhed-for favourable circumſtance attended the whole of that day, without one ſingle impediment, excepting the heat, which was intolerable: the thermometer which hung by the clock and was expoſed to the ſun as we were, was one time as high as 119°. The breadth of the penumbra appeared to me, to be nearly equal to $\frac{1}{8}$th of Venus's ſemidiameter.

Tranſit of Venus by Dr. Solander, with a 3 feet reflecting teleſcope.

Time per clock h	'	"		App. time		
9	22	11	Firſt external contact plainly convex, a wavering haze ſeen ſome ſeconds before			
9	39	33	Ingreſs, light ſeen glimmering under Venus	21	43	28
9	40	07	♀'s free from the ☉'s limb	21	44	2
3	27	51	♀'s true limb out	3	31	49
3	28	15	♀'s atmoſphere out	3	32	13

Obſervations of the Tranſit of Venus, made by Mr. Charles Green, with Dollond's micrometer fitted to a reflecting teleſcope of 2 feet focus.

June 2 1769.

In.	pts.	ver.		In.	pts.	ver.	
0	10	24	Venus's diameter meaſured off the ſcale.	0	10	5	Venus's diameter meaſured on the ſcale.
0	10	24		0	10	5	
0	10	24		0	10	4½	
0	15	0		0	10	4	
0	10	24		0	10	4	
0	10	24		0	10	5	
0	10	24		0	10	4	
Mean 0	10	24,14		Mean 0	10	4,50	

Half the difference of theſe two means is +9,82 ver. = +8,4" the correction of the adjuſtment of the micrometer to be added to all obſervations made on the ſcale; and half the ſum of the two means is 10 pts. 14,31 ver. = 54,97" Venus's apparent diameter.

After the above meaſurements of Venus' diameter, I fixed my teleſcope on an equatoreal ſtand, which was ſcrewed down to a large caſk filled with ſand and water; and by repeated trials a day before, an object (as the ſun) would move on along the wire a quarter of an hour without any ſenſible difference. Thus equipped, I took the following obſervations, a careful perſon noting the time by the clock and another writing down. By repeated

peated trials ſome days before, I found the teleſcope at diſtinct viſion, when it ſtood at 0 on the ſcale; therefore I put it to this before I meaſured Venus's diameter.

I read them all off myſelf and ſaw each written down.

Time by the clock			Apparent time			Meaſure by micrometer			D°. red. & cor. in min. & ſec.		
H	M	S	H	M	S	In.	pts.	V.	M	S	
22	35	28	22	39	24	0	50	18	3	57,4	Difference of declination between the North limb of Venus and the North limb of the Sun.
22	41	0	22	44	56	0	50	15	3	54,8	
22	45	34	22	49	30	0	50	12	3	52,3	
22	50	54	22	54	50	0	50	20	3	59,1	
22	57	44	23	1	40	0	50	8	3	48,8	
23	6	47	23	10	43	1	75	2	12	37,7	Diſtance of the Eaſtern limbs of the Sun and Venus in lines parallel to the equator; or rather the tranſlation of Venus, in order to produce an artificial internal contact with the Sun to the Eaſt.
23	11	5	23	15	1	1	75	18	12	51,4	
23	14	51	23	18	47	1	80	7	13	3,3	
23	18	36	23	22	32	2	35	19	17	8,5	Diſtance of the Weſtern limbs of the Sun and Venus in lines parallel to the equator.
23	23	21	23	27	17	2	30	16	16	44,5	
23	25	49	23	29	45	2	30	0	16	30,8	
23	31	9	23	35	6	0	55	24	4	23,8	Difference of declination between the Northern limbs of the Sun and Venus.
23	35	50	23	39	47	0	60	3	4	27,3	
23	40	9½	23	44	6	0	60	5	4	29,0	
23	45	2	23	48	59	3	75	12	27	0,5	Difference of declination between the South limb of the Sun and the North limb of Venus.
23	47	53	23	51	50	3	75	14	27	2,2	
23	50	0	23	53	57	3	75	7	26	56,2	

I now took my teleſcope from the equatoreal ſtand, and placed it on its own proper ſtand and took the following obſervations.

June 3 1769											
0	2	10	0	6	7	0	80	3	5	52,7	Neareſt diſt. of ☉'s N. limb from ♀'s S. limb
0	7	53	0	11	50	3	75	2	26	51,9	Greateſt diſt. of ☉'s S. limb from ♀'s N. limb
0	11	42	0	15	39	0	80	2	5	51,8	Neareſt diſt. of ☉'s N. limb from ♀'s S. limb
0	14	17	0	18	14	3	75	3	26	52,8	Greateſt diſt. of ☉'s S. limb from ♀'s N. limb
0	18	19	0	22	16	0	80	0	5	50,1	Neareſt diſt. of ☉'s N. limb from ♀'s S. limb
0	20	14	0	24	11	3	70	16	26	42,5	Greateſt diſt. of ☉'s S limb from ♀'s N. limb
0	23	13	0	27	10	0	80	6	5	55,2	Neareſt diſt. of ☉'s N. limb from ♀'s S. limb
0	25	28½	0	29	25	3	70	18	26	44,2	Greateſt diſt. of ☉'s S. limb from ♀'s N. limb
0	27	37	0	31	34	0	80	5	5	54,4	Neareſt diſt. of ☉'s N. limb from ♀'s S. limb

Time

Time by the clock			Apparent time			Meaſure by micrometer			D°. red. & cor: in min. & ſec.		
H	M	S	H	M	S	In.	pts.	V.	M	S	
0	29	35	0	33	32	3	70	20	26	45,9	Greateſt diſt. of ☉'s S. limb from ♀'s N. limb
0	34	18	0	38	15	0	80	5	5	54,4	Neareſt diſt. of ☉'s N. limb from ♀'s S. limb
0	36	59	0	40	56	3	70	19	26	45,1	Greateſt diſt. of ☉'s S. limb from ♀'s N. limb
0	38	53½	0	42	50	0	80	3	5	52,7	Neareſt diſt. of ☉'s N. limb from ♀'s S. limb
0	40	37	0	44	34	3	70	24	26	49,3	Greateſt diſt. of ☉'s S. limb from ♀'s N. limb
0	42	19	0	46	16	0	80	4	5	53,5	Neareſt diſt. of ☉'s N. limb from ♀'s S. limb
0	44	34	0	48	31	3	70	23	26	48,5	Greateſt diſt. of ☉'s S. limb from ♀'s N. limb
0	46	12	0	50	9	3	75	0	26	50,2	Greateſt diſt. of ☉'s S. limb from ♀'s N. limb
0	48	11	0	52	8	0	80	0	5	50,1	Neareſt diſt. of ☉'s N. limb from ♀'s S. limb
0	58	13	1	2	10	0	75	15	5	41,6	Neareſt diſt. of ☉'s N. limb from ♀'s S. limb
1	0	55	1	4	52	3	75	10	26	58,8	Greateſt diſt. of ☉'s S. limb from ♀'s N. limb
1	3	4	1	7	1	0	75	9	5	36,5	Neareſt diſt. of ☉'s N. limb from ♀'s S. limb
1	5	51	1	9	48	3	75	15	27	3,0	Greateſt diſt. of ☉'s S. limb from ♀'s N. limb
1	8	21½	1	12	19	0	75	2	5	30,5	Neareſt diſt. of ☉'s N. limb from ♀'s S. limb
1	10	47	1	14	44	3	75	21	27	8,2	Greateſt diſt. of ☉'s S. limb from ♀'s N. limb
1	12	34	1	16	31	0	70	21	5	25,4	Neareſt diſt. of ☉'s N. limb from ♀'s S. limb
1	15	57	1	19	54	3	80	8	27	18,3	Greateſt diſt. of ☉'s S. limb from ♀'s N. limb
1	17	12	1	21	9	0	70	16	5	21,1	Neareſt diſt. of ☉'s N. limb from ♀'s S. limb
1	19	34½	1	23	32	0	70	15	5	20,2	Neareſt diſt. of ☉'s N. limb from ♀'s S. limb

At the laſt obſervation I looked at the thermometer which was cloſe by me, and it was 113 degrees high.

With my teleſcope as before, I meaſured the following horizontal diameters of the Sun and Venus.

	4	35	24			The Sun's horizontal diameter.
	4	35	24			
	4	40	0			
	4	40	0			
	4	35	24			
	4	35	24			
	4	40	0			
Mean	4	35	24,43	31	27,4	

	0	10	24	Venus's diameter meaſured off the ſcale.
	0	10	23½	
	0	10	24	
	0	10	24	
	0	10	24½	
Mean	0	10	24	

	0	10	3	Venus's diameter meaſured on the ſcale.
	0	10	4	
	0	10	4	
	0	10	5	
	0	10	6	
	0	10	3	
Mean	0	10	4,16	

Half the difference of theſe two means, is + 9,92 vern. = + 8,5″ the correction of the adjuſtment of the micrometer, which only differs $\frac{1}{10}$th of a ſecond from what was found by the meaſures of Venus's diameter before. Half the ſum of the two means is 10 14,08 = 54,77″ Venus's apparent diameter, which was found before 54,97″. The mean of the two reſults is 54,87″ or 54,9″.

After the laſt meaſurements of the Sun and Venus's diameters, I replaced my teleſcope on the equatoreal ſtand, and took the following obſervations.

Time by the clock			Apparpnt time			Meaſure by micrometer			D°. red. & cor. in min. & ſec.		
H	M	S	H	M	S	In.	pts.	V.	M	S	
1	59	37	2	3	35	0	85	21½	6	29,9	Diſt. of W. L. of ☉ and ♀ in lines parall. to the equat.
2	6	32	2	10	30	3	45	0	24	42,0	Diſt. of E. L. of ☉ and ♀ in lines parallel to the equat.
2	10	44	2	14	42	0	95	10	7	2,8	Diff. of declin. of N. L. of ☉ and ♀
2	14	30	2	18	28	3	25	4	23	20,0	Diff. of declin. of S. L. of ☉ and ♀
2	17	55	2	21	53	1	0	2	7	17,3	Diff. of declin. of N. L. of ☉ and ♀
2	21	5	2	25	3	3	25	1	23	17,5	Diff. of declin. of S. L. of ☉ and ♀
2	24	7	2	28	5	0	75	20	5	45,9	Diſt. of W. L. of ☉ and ♀ in lines par. to the equat.
2	27	54	2	31	52	3	65	0	26	7,4	Diſt. of E. L. of ☉ and ♀ in lines par. to the equat.

Here follows the Table of the value of the ſcale of the object glaſs micrometer, which was delivered in by Mr. Short, together with the teleſcope, by which the reductions of the foregoing obſervations were made.

TABLE for the object glaſs micrometer; the focal length of which object glaſs is = 482,867 inches.

Inches	Correſponding angle in min. and ſec.		Dec. of an inch	Angle in min. and ſec.		Parts of the ver.	Angle in ſeconds
	′	″		′	″		″
1	7	7,2	,05	0	21,4	1	0,9
2	14	14,3	,10	0	42,7	2	1,7
3	21	21,4	,15	1	4,1	3	2,6
4	28	28,6	,20	1	25,4	4	3,4
5	35	35,8	,25	1	46,8	5	4,3
			,30	2	8,1	6	5,1
			,35	2	29,5	7	6,0
			,40	2	50,9	8	6,8
			,45	3	12,2	9	7,7
			,50	3	33,6	10	8,6
			,55	3	54,9	11	9,4
			,60	4	16,3	12	10,3
			,65	4	37,6	13	11,1
			,70	4	59,0	14	12,0
			,75	5	20,4	15	12,8
			,80	5	41,7	16	13,7
			,85	6	3,1	17	14,5
			,90	6	24,4	18	15,4
			,95	6	45,8	19	16,3
						20	17,1
						21	18,0
						22	18,8
						23	19,7
						24	20,5

Obſervations

Obſervations on the Tranſit of Venus, June 3, 1769, by Dollond's micrometer fitted to a reflecting teleſcope of 18 inches focus, by Capt. James Cook.

Venus's diameter, ſoon after the ingreſs.

Off the ſcale			On the ſcale		
In.	Dec.	Ver.	In.	Dec.	Ver.
0	10	4	0	10	4
0	10	3	0	10	6
0	10	4	0	10	6
0	10	4	0	10	5
0	10	3¾	0	10	5¼

By theſe meaſurements the correction of adjuſtment of the micrometer —0¾ of a diviſion of the vernier, and ♀'s diameter 10 d. 4½ v.=56,8.

June 2

Time per Gl.			Appar. Time			In.	D.	V.	M	S	
h	′	″	h	′	″						
23	3	1	23	6	57	3	20	20	28	6,6	Greateſt diſtance of ♀ and ☉ in outer contact.
23	6	46	23	10	42	3	20	18	28	4,6	
23	10	8	23	14	4	3	20	15	28	1,4	
23	14	36	23	18	32	3	20	10	27	56,2	
23	24	36	23	28	32	0	55	23	5	8,8	Leaſt diſtance of ♀ and ☉ in outer contact.
23	26	38	23	30	35	0	60	3	5	14,0	
23	29	38	23	33	35	0	60	4	5	15,1	
23	31	54	23	35	51	0	60	9	5	20,3	

Venus's diameter June 3.

	Off the ſcale			On the ſcale		
	In.	D.	V.	In.	D.	V.
	0	10	2	0	10	6
			1			7
			2			6
			2			6
Mean	0	10	1¾	0	10	6¼

By theſe meaſurements the correction of adjuſtment is —2¼ and Venus's diameter 0 10 4 = 56,″28.

The Sun's horizontal diameter at 0h 22′.

In.	D.	V.
3	60	18
		16
		19
		17

The Sun's horizontal diameter at 0^h 22′.

In. D. V.
16
17
17
20
18
17
20
21

Mean 3 60 18 From which ſubtract 2¼ leaves 3 60 15¾
(In. D. V.)

Time per Cl.			App. Time			Meaſure by micrometer			D°. red. and corrected			
h	′	″	h	′	″	In.	D.	V.	M	S		
1	4	29	1	8	26	3	10	11	27	3,8	Greateſt diſtance of ♀ and ☉ in outer contact.	
	7	17	1	11	14	3	10	18	27	11,5		
	8	33	1	12	30	3	10	2[illegible]	27	16 3		
1	14	16	1	18	13	0	60	15	5	25 1	Leaſt diſtance of ♀ and ☉ in outer contact.	
	15	45	1	19	42	0	60	15	5	25 1		
	16	55	1	20	52	0	60	9	5	18.8		
1	25	2[illegible]	1	29	22	3	15	18	27	37,2	Greateſt diſt.	of the limbs of the Sun and Venus meaſured externally.
1	27	29	1	31	26	0	55	18	5	2,3	Leaſt diſtance	
1	32	15	1	36	13	3	20	1	27	45,5	Greateſt diſt.	
1	34	12	1	38	10	0	55	4	4	47,7	Leaſt diſtance	
1	36	5	1	40	3	3	20	10	27	54,9	Greateſt diſt.	
1	38	19	1	42	1[illegible]	0	55	0	4	43.5	Leaſt diſtance	
1	40	5	1	44	3	3	20	15	28	0,1	Greateſt diſt.	
1	41	48	1	45	46	0	50	21	4	39.4	Leaſt diſtance	
1	43	24	1	47	22	3	20	22	8	7,4	Greateſt diſt.	
1	46	0	1	49	58	0	50	15	4	33,1	Leaſt diſtance	

The Sun's diameter at 2^h 10′.

3 60 18
18
16½
17
17
20
16

Mean 3 60 17½ from which ſubtract 3¾ leaves 3 60 13¾

Venus's diameter.

0	10	2	0	10	8
	5	24			6
	5	24			8
	10	0			8
0	10	0	0	10	7½

By theſe meaſurements, the correction of adjuſtment of the micrometer, is — 3¾ and Venus's diameter 10 D. 3¾ V. = 56″,02.

The mean of the three ſeparate deductions of Venus's obſerved diameter, is 56″,4.

A TABLE for reducing the foregoing obſervations deduced from the meaſures of the Sun's horizontal diameter, ſuppoſed = 31′ 31″.

Inches	Angle		Decimals of an In.	Angle		Div. of Vern.	Angle
	′	″		M	S		S
1	8	41,1	,05	0	26,1	1	1,0
2	17	22,2	,10	0	52,1	2	2,1
3	26	3,3	,15	1	18,2	3	3,1
			,20	1	44,2	4	4,2
			,25	2	10,3	5	5,2
			,30	2	36,3	6	6,2
			,35	3	2,4	7	7,3
			,40	3	28,5	8	8,3
			,45	3	54,5	9	9,4
			,50	4	20.6	10	10,4
			,55	4	46,6	11	11,5
			,60	5	12,7	12	12,5
			,65	5	38,7	13	13,5
			,70	6	4,8	14	14,6
			,75	6	30.8	15	15,6
			,80	6	56,9	16	16,7
			,85	7	22,9	17	17,7
			,90	7	49,0	18	18,8
			,95	8	15.1	19	19,8
			1,00	8	41,1	20	20,8
						21	21,9
						22	22,9
						23	24,0
						24	25,0
						25	26,1

N. B. The obſervations made by Mr. Green with Dollond's micrometer, particularly thoſe concerning the difference of declination of Venus and the Sun's limbs, and the diſtances of Venus from the Sun's limb in lines parallel to the equator, will be better underſtood by conſulting a paper intitled Directions for obſerving the Differences of Declination &c. with Dollond's Micrometer, by N. Maſkelyne, Aſtronomer Royal, a copy of which was given to Mr. Green, before his departure from England; which will appear in this volume.

Obſerva-

Obſervations on the Dipping Needle.

Time when		Place where.	Dip of the North or South point		
			°	′	
1768					
Sept.	13	In Funchal Bay, dip of N. end of needle	77	18	
October	25	Croſſing the line in long. 30° 18′ W. of Greenwich	26 to 28		N. point
1769					
January	10	At ſea in lat. 52° 54′ S. and long. 63° 10′ W.	63		S. point
	20	Good Succeſs Bay in Straits Le Maire	68	51	Ditto
	24	On board the ſhip at anchor in the above bay	65	00	Ditto
	30	At ſea in lat. 60° 04′ S. long. 74° 10′ W.	65	17	Ditto
March	3	Ditto, ditto, 36 49 S. ditto 111 54 W.	65	52	Ditto
	13	Ditto, ditto, 30 46 S. ditto 125 28 W.	64	25	Ditto
April	5	Ditto, ditto, 18 25 S. ditto 140 51 W.	30	00	Ditto

N. B. Each of the above Obſervations is the mean of ten, twelve, or more; with the face of the inſtrument turned alternately Eaſt and Weſt: thoſe made at ſea are a little dubious on account of the motion of the ſhip; but, by means of a ſwinging table we had made to ſet the compaſs upon, we could, in a tolerable ſmooth ſea, be certain of the dip to a degree, or at the moſt two, by taking the mean of a great number of trials.

1769			°			
May	30	George's Iſland	29	26	South point Face	Eaſt
			29	40		Weſt
			30	10		Eaſt
			31	45		Weſt
			31	00		Eaſt
			31	00		Weſt
			30	51		Eaſt
			30	40		Weſt
			30	18		Eaſt
			30	25		Weſt
			30	21		Eaſt
			30	40		Weſt
			31	00		Eaſt
			30	42		Weſt
			30	45		Eaſt
			31	30		Weſt
			31	50		Eaſt
			30	16		Weſt
			30	16		Eaſt
			30	48		Weſt
			31	45		Eaſt
		Mean	30	43		

1770 January 19, in Queen Charlotte's Sound, ſat. 41° 5′ S. long. 184 35 W. The dip of the South end of the needle 54° 40′.

Obſervations on the Dipping Needle.

	° ′		
May 1 Botany Bay Lat. 34 00 S. Long. 208 37 W.	67 20	South Point Face	Eaſt
	66 40		Weſt
	66 55		Eaſt
	67 08		Weſt
	Mean 67 01		

July 18 Endeavour River Lat. 15 26 S. Long. 214 48 W.	36 54	South Point Face	Weſt
	40		Eaſt
	06		Weſt
	35 14		Eaſt
	35 14		Weſt
	36 00		Eaſt
	00		Weſt
	Mean 36 0		

James Cook.

Obſervations on the Tides at K. Georges Iſland.

Day of the month	Time of low water	Time of high water	Height of tides	The moon paſſes the merid. above the horizon	The moon paſſes the merid. below the horizon
1769	H M	H M	Inches	H M	H M
June 4	6 0 A. M.	Noon	9½	0 36 P. M.	
5	6 0 A. M	Noon	8½	1 40 P. M.	
6	7 30 A. M.			2 40 P. M.	
7	8 0 A. M.	1 45 P. M.	9	3 34 P. M.	
8	8 41 A. M.	2 10 P. M.	8½	4 25 P. M.	
9	8 42 A. M.	3 15 P. M.	9¼	5 12 P. M.	
10		4 0 P. M	8½	5 57 P. M.	
12		5 0 P. M.		7 23 P. M.	
14	7 41 A. M.				8 29 A. M.
17	8 40 A. M.	1 16 P. M.	9½		10 50 A. M.
18	8 50 A. M.	11 40 A.M.	10		11 38 A. M.
19	8 10 A. M.	0 15 P. M.	9		0 27 A. M.
20	8 0 A. M.	0 30 P. M.	9		
	water ſtands at 5 inches on mark	water ſtands at 14 inches on mark			1 26 P. M.

Obſervations on the Tides at K. George's Iſland.

Day of the month	Time of low water	Time of high water	Height of tides	The moon paſſes the merid. above the horizon	The moon paſſes the merid. below the horizon
1769	H M	H M	Inches	H M	H M
June 21	7 30 A. M. water at 5 in.				2 4 P. M.
22	8 30 A. M. water at 5 in				2 50 P. M.
25	10 15 A.M.				5 8 P. M.
27		7 0 A. M.	12½	6 19 A. M.	
28		8 0 A. M.	13	7 11 A. M.	
July 2	6 30 A. M	Noon		11 13 A. M.	
3	6 30 A. M. water at 3 inches	0 30 P. M. water at 13 inches	10	0 15 P. M.	
4	7 15 A. M. water at 3 inches	1 0 P. M water at 13 inches	10	1 13 P. M.	
5	7 30 A. M. water at 3 inches			2 7 P. M.	

Hence the mean height of the ſides is about 10 inches, and the greateſt height ſcarcely exceeds one foot, in the middle of this wide-extended ocean; which falls far ſhort of what might have been expected from phyſical principles. The cauſe of this remarkable differenee deſerves farther inquiry. The time of high water alſo appears to precede the moon's paſſing the meridian by 45 minutes at a medium, and the time of low water to precede the ſame, by 6ʰ 31′. But the mean difference of high and low water, ſhould be 6ʰ 12′, which ſubtracted from 6ʰ 31′, leaves 0ʰ 19′, by which the time of high water ſhould precede the moon's paſſing the meridian; the mean of this and 0ʰ 45′ is 32′, by which the time of high water precedes the moon's paſſing the meridian, by a medium of all the obſervations. The times of high and and low water ſeem to be ſubject to great irregularity on particular days; no doubt owing to the ſmall riſe of the water, and the ſmallneſs of its force in conſequence, which renders it more liable to be diſturbed by the action of the winds and other cauſes: part of the irregularity may be attributed to the difficulty of obſerving the time of the flood or ebb, with any degree of certainty. N. M.

N. B. The iſland here named King George's Iſland, is called by the natives Ota-heite, by which name it will henceforth be called, the name of K. George's Iſland having been given before to another iſland in lat. 14 S. diſcovered by Commodore Byron.

⁂ Mr. Green having died at ſea in the paſſage home from Batavia, all the aſtronomical and other obſervations were partly arranged by Capt. Cook, and partly by the Aſtronomer Royal, from the original manuſcripts, and calculated by the latter.